Appendix D

Summary of Ecotoxicity Data for Chlorophacinone

Table D-1. Freshwater Fish Acute Toxicity of Chlorophacinone					
Species[1,2]	**% a.i.**	**96-hourLC_{50} (mg a.i./L)**	**Toxicity Category**	**MRID No.**	**Study Classification**
Bluegill sunfish, (*Lepomis macrochirus*)	100	0.710	Highly toxic	43256102* (Machado, 1992)	Acceptable (flow-through, 10 fish/level)
Rainbow trout, (*Onchorhynchus mykiss)*	100	0.450	Highly toxic	43256103** (Machado, 1992)	Acceptable (flow-through, 10 fish/level)
*In previous assessments this study was cited as MRID 43249501; the correct MRID is 43256102. ** In previous assessments this study was cited as MRID 43249502; the correct MRID is 43256103.					

Table D-2. Freshwater Invertebrate Acute Toxicity of Chlorophacinone					
Species	**% diquat cation**	**48-hourEC_{50} (mg/L)**	**Toxicity Category**	**MRID No. Author, Year**	**Study Classification**
Water flea (*Daphnia magna*)	100	0.64	Highly toxic	42356101 (Putt, 1992)	Acceptable (flow-through)

Table D-3: Avian Acute Toxicity to Chlorophacinone					
Species	**% A.I.**	**Toxicity Endpoint**	**Toxicity Classification**	**MRID**	**Status**
Acute Single Oral Dose					
Bobwhite quail (*Colinus virginianus*)	100	LD_{50}= 258 mg/kg-bw [1]	Moderately toxic	41513101 (Fletcher and Pederson, 1989)	Acceptable
Bobwhite quail (*Colinus virginianus*)	Tech.	LD_{50}= 495 mg/kg-bw[2]	Not classified, study not reviewed	39233 (Beavers et al., 1979)	Study not yet reviewed by EPA; endpoints as reported by study author.
Acute Dietary					
Bobwhite quail (*Colinus virginianus*)	100	LC_{50} = 56 mg/kg-diet [3]	Highly toxic	41513102 (Fletcher and Pederson, 1989)	Acceptable
Mallard duck (*Anas platyrhynchos*)	100	LC_{50} = 172 mg a.i./kg-diet [4]	Highly toxic	41513103 (Fletcher and Pederson, 1989)	Acceptable
Bobwhite quail (*Colinus virginianus*)	Tech.	LC_{50} = 242 mg a.i./kg-diet [5]	Not classified, study not reviewed	29144 (Beavers et al., 1979)	Study not yet reviewed by EPA; endpoints as reported by study author.
Mallard duck (*Anas platyrhynchos*)	Tech	LC_{50} = 426 mg a.i./kg-diet [5]	Not classified, study not reviewed	29143 (Beavers et al., 1979)	Study not yet reviewed by EPA; endpoints as reported by study author.
Japanese quail (*Coturnix c. japonica*)	0.25% oil concentrate	LC_{50} = 60 mg a.i./kg-diet[4]	Highly toxic	47323201 (Reidel et al, 1990)	Supplemental (non-GLP study, raw data not submitted)

[1] Birds were dosed on day 0 and followed for 30 days after dosing. All mortalities occurred within 5 days of the start of the test.

[2] Birds were dosed on day 0 and followed for 14 days after dosing. All mortalities occurred within 10 days of the start of the test.

[3] Birds were fed treated diet for 5 days and untreated diet for the following 25 days. All mortalities occurred within nine days of the start of the test.

[4] Birds were fed treated diet for 5 days and untreated diet for the following 3 days. Total observation time was 8 days after start of test.

[5] Birds were fed treated diet for 5 days and untreated diet for the following nine days. Birds were observed for a total of 14 days.

Table D-4: Avian Sub-Chronic Toxicity to Chlorophacinone				
Species	**% A.I.**	**Toxicity Endpoints**	**Affected Endpoints**	**MRID and Status**
Japanese quail (*Coturnix c. japonica*)	0.25% oil concentrate	NOAEC = 1 mg a.i./kg-diet LOAEC = 2 mg a.i./kg-diet	-Adult mortality at all test levels greater than 1 mg a.i./kg-diet. -Increased relative liver mass and prothombin time at 4 mg a.i./kg-diet and greater for females. -Increased liver mass, relative liver mass and prothombin time at 8 mg a.i./kg-diet and greater for males. -Progeny appear unaffected.	47323201 (Reidel et al, 1990) Supplemental (non-guideline, non-GLP study, raw data not submitted)

Table D-5: Mammalian Acute Toxicity to Chlorophacinone					
Test Type	**% A.I.**	**Toxicity Endpoint**	**Toxicity Classification**	**MRID**	**Status**
Acute (gavage) Laboratory rat *Rattus norvegicus*	100%	LD_{50} = 3.15 mg a.i./kg-bw (male) LD_{50} = 10.95 mg a.i./kg-bw (female) LD_{50} = 6.26 mg a.i./kg-bw (combined)	Very highly toxic	41875301	Acceptable [a] (Single dose, mortalities occurred 4 to 9 days after dosing)
Acute gavage Black-tailed Prairie Dogs (*Cynomys ludovicianus*)	99.4%	LD_{50}: 1.94 mg ai/kg bw 95% C.I.: (1.46, 5.77) Slope = 3.45	Very highly toxic	47333601	Supplemental (Single dose, mortalities occurred 9 to 22 days after dosing) (sufficient raw data not included)
5-day multiple dose Norway Rat (wild type) *Rattus norvegicus*		5-day cumulative dose LD_{50} = 0.8 mg a.i./kg-bw Doses were administered daily for 5 days, the 5-day LD_{50} = 0.8 mg a.i./kg-bw is equivalent to 5 days of administration of 0.16 mg a.i./kg-bw/day	Very highly toxic	Ashton, et al. (1987)	Qualitative (no controls, length of observation not stated, time of mortalities and additional raw data not provided)
5-day multiple dose Laboratory Rat *Rattus norvegicus*		5-day cumulative dose LD_{50} = 0.95 mg a.i./kg-bw Doses were administered daily for 5 days, the 5-day LD_{50} = 0.95 mg a.i./kg-bw is equivalent to 5 days of administration of 0.19 mg a.i./kg-bw/day	Very highly toxic	Ashton, et al. (1987)	Qualitative (no controls, length of observation not stated, time of mortalities and additional raw data not provided)
5-day multiple dose Laboratory mouse (*Mus musculus*)		5-day cumulative dose LD_{50} = 5.95 mg a.i./kg-bw Doses were administered daily for 5 days, the 5-day LD_{50} = 5.95 mg a.i./kg-bw is equivalent to 5 days of administration of 1.19 mg a.i./kg-bw/day	Very highly toxic	Ashton, et al. (1987)	Qualitative (no controls, length of observation not stated, time of mortalities and additional raw data not provided)
Dietary Laboratory Rat *Rattus norvegicus*		1.14 (1.02-1.36) mg a.i./kg-diet 1.14 (0.98-1.35) mg a.i./kg-diet 1.26 (1.11-1.47) mg a.i./kg-diet 1.26 (0.97-1.64) mg a.i./kg-diet		Teeters 1981 (TNM 117)*	Supplemental

[a] As classified by OPP Health Effects Division (HED)

*Teeters, W.R.(1981) Chlorophacinone technical: Toxicity to Laboratory Rat: Test No. 117. (U.S. Environmental Protection Agency, Pesticides Regulation Div., Agricultural Research Center, Animal Biology Laboratory, unpublished report.)

Table D-6: Mammalian Developmental and Maternal Toxicity to Chlorophacinone					
Test Type	**% A.I.**	**NOAEL (µg/kg-bw/day)**	**LOAEL (µg/kg-bw/day)**	**Affected Endpoints**	**MRID (Status)**
Developmental (New Zealand white rabbit)	101	Maternal NOAEL = 5 Develop NOAEL = 10	Maternal LOAEL = 10 Develop LOAEL = 25	Dose administered by oral gavage daily from gestation days 7 to 19, inclusive. Maternal NOAEL based on increased prothrombin and activated partial thromboplastin times in the preliminary range-finding study at gestation day 20. Developmental NOAEL based on lack of sufficient fetuses/litters at the higher dose levels as high mortality was observed (13/16 rabbits at 25 µg/kg/day and 16/16 rabbits at 75 µg/kg/day) in definitive test. In addition external bleeding and internal hemorrhage were observed in the 25 µg/kg/day and 75 µg/kg/day dose groups.	43570801 (Acceptable[a])
Developmental (Laboratory rat)	101	Maternal NOAEL = 50 Develop NOAEL<12.5	Maternal LOAEL = 100 Develop LOAEL≤12.5	Dose administered by oral gavage daily from gestation days 6 to 15, inclusive. Maternal NOAEL based on dam mortality. Developmental NOAEL based on increased incidences of hydroureter, distended ureter and total ureter anomaly in the fetuses.	43349501 (Acceptable[a])
[a] As classified by OPP Health Effects Division (HED)					

Table D-7: Toxicity to Chlorophacinone to Non-target Terrestrial Invertebrates				
Species	**% A.I.**	**Toxicity Endpoints**	**MRID**	**Status**
Burying beetle *Nicrophorus orbicollis*	100	Number of beetle young emerging and total biomass of young was reduced in beetle trt group laying eggs in carcasses fed 50 mg a.i./kg-bait for 5-10 days compared when to control.	47383001	Supplemental (non-guideline)
Earthworm (*Eisenia foetida*)	99.77	LC_{50} > 1000 mg ai/kg-soil NOAEC (mortality) = 309 mg ai/kg-soil NOAEC (weight change) < 95 mg ai/kg-soil	47383002	Study not yet reviewed by EPA; endpoints as reported by study author.